

International Student Mobility and Freedom Level of Origin Countries

by

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A Dissertation Submitted to the
Graduate School of Social Sciences and Humanities
in Partial Fulfillment of the Requirements for
the Degree of

Master of Arts

in

Economics



August 14, 2020

International Student Mobility and Freedom Level of Origin Countries

Koç University

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To my family.

ABSTRACT

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The commonly preferred destination countries by international students are considered among the most democratic countries in the world. We explore whether and how deteriorating freedom level in origin countries affects the behavior of pursuing higher education abroad. Particularly, we focus on student migration from three countries where the freedom level has deteriorated in the 2010s according to the democracy index of the Freedom House: Hungary, Venezuela, and Indonesia. We employ data of the population of international students in the OECD countries for 2004-2016 period. To estimate the causal effect of deteriorating freedom level on the outmigration of students, we apply two different estimation techniques: Difference-in-Differences (DD) and the Synthetic Control Method (SCM). We find that deteriorating freedom in countries increases the outmigration of its young citizens in most instances where the applied research method provides an appropriate comparison unit. Particularly, DD estimates show a statistically significant increase in the population of students pursuing higher education abroad for Venezuela, and SCM estimates show a statistically significant increase for Hungary.

Keywords: international students, mobility, freedom, democracy, Synthetic Control Method.

ÖZETÇE

Uluslararası Öğrenci Göçü ve Menşe Ülkelerin Özgürlük Düzeyleri

Burak Dalaman

Ekonomi, Yüksek Lisans

14 Ağustos 2020

Öğrenciler tarafından en çok tercih edilen ülkeler en demokratik ülkeler olarak nitelendirilmektedirler. Menşe ülkelerdeki özgürlük düzeyinin kötüleşmesinin yurtdışında yüksek öğrenim görme davranışını etkileyip etkilemediğini ve nasıl etkilediğini araştırıyoruz. Özellikle, Freedom House'un demokrasi endeksine göre 2010'larda özgürlük seviyesi kötüleşen ülkelere Macaristan, Venezuela ve Endonezya'dan öğrenci göçlerine odaklanıyoruz. OECD ülkelerinde yer alan uluslararası öğrenci popülasyonunun 2004-2016 yılları arası verilerini kullanıyoruz. Deneyisel analizimizde, her bir menşe ülke için uluslararası öğrenci sayısını OECD'den ve menşe ülkelerdeki özgürlük endeksi değerlerini de Freedom House'dan alıyoruz. Kötüleşen özgürlük düzeyinin uluslararası öğrencilerin göçü üzerindeki nedensel etkisini tahmin etmek için iki farklı tahmin tekniği uyguluyoruz: Farkların Farkı (FF) ve Sentetik Kontrol Yöntemi (SKY). FF tahminleri Venezuela için yurtdışında yüksek öğrenim gören öğrenci nüfusunda istatistiksel olarak anlamlı bir artış gösterirken SKY tahminleri Macaristan için istatistiksel olarak anlamlı bir artış göstermektedir.

Anahtar Kelimeler: uluslararası öğrenciler, göç, özgürlük, demokrasi, Sentetik Kontrol Yöntemi.

AKNOWLEDGEMENTS

I express my gratitude to my advisor Murat Demirci, without his guidance and support, finishing my thesis would not be possible. I would also like to thank the committee members Aysun Hızıroğlu Aygün and Muhammed Ali Yıldırım; my professors Cem Çakmaklı, Han Özsöylev, İnsan Tunalı, Kamil Yılmaz, Levent Koçkesen, Mert Kimya, Özgür Yılmaz, Sumru Altuğ, and Ufuk Akçiğit; and my guarantor Mustafa Cihat Akgöz for their moral and material support during my studies. I am also grateful to the Graduate School of Sciences and Humanities members for their guidance since the beginning of the program.

I would also like to thank the Scientific and Technological Research Council of Turkey (TÜBİTAK) for the financial support through the 2210-A Master's Scholarship Program.

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ABBREVIATIONS

CL	Civil Liberties
DD	Difference-in-Differences
EU	European Union
NGOs	Non-Governmental Organizations
OECD	Organization for Economic Co-Operation and Development
OLS	Ordinary Least Squares
OVb	Omitted Variable Bias
PR	Political Rights
RMSE	Root Mean Squared Error
SCM	Synthetic Control Method

Section 1:

INTRODUCTION

The population of international students in countries of the Organization for Economic Co-Operation and Development (OECD) has increased from about 1.9 million students in 2004 to 3.4 million students in 2016.¹ The number of international students in the top five destination countries, including the United States, the United Kingdom, Australia, France, and Germany, made up 65% of all students as of 2016 in the OECD countries. In addition to their advanced higher education system and developed economies, another prominent feature of these countries is that they are among the most democratic countries according to the freedom index data. In this study, we explore whether and how deteriorating freedom level of origin countries affects the student migration from these countries to the OECD members. Particularly, we focus on the student migration from three countries where the freedom level has deteriorated in the 2010s: Hungary, Venezuela, and Indonesia.

We analyze these three origin countries from different geographies with distinct features to inquire whether the impact of freedom differs by institutional factors of the origin country. The most democratic one of these treated countries is Hungary from Europe, the less democratic one is Indonesia from Southeastern Asia, and the least democratic one is Venezuela from South America according to the freedom index of the Freedom House.

We obtain the population of international students for each origin country from the OECD and values of the freedom index in origin countries from the Freedom House in the empirical analysis. Since the freedom index is not the only factor that shapes student preferences, we also use GDP per capita, youth unemployment rate and youth population in origin countries as additional control variables. To estimate the causal effect of deteriorating freedom level on migration of international students, we apply two different estimation techniques: Difference-in-Differences (DD) and the Synthetic Control Method (SCM). The key challenge in finding the causal impact is to find a comparison country (or a group of countries) where the outflow of international students follows a similar

¹ International students denote the students who are foreign-born and migrate abroad for the purpose of education.

trend to the one observed in the treated country of interest before the deterioration of the freedom index in the treated country. In the DD method, we use neighboring countries of Hungary, Venezuela, and Indonesia to construct this comparison unit. On the other hand, the SCM allows us to construct a comparison unit in a systematic way, which is driven by the trends of potential determinants of the student mobility. In particular, we use GDP per capita, youth unemployment rate and youth population size of origin countries as control variables to construct the comparison unit resembling to the treated country in the pre-treatment period in the SCM estimations.

DD estimates show a statistically significant increase in the population of students pursuing higher education abroad for Venezuela after the deterioration of freedom in that country, but not for Hungary and Indonesia. In particular, DD estimates show that the population of international students originating from Venezuela increases by about 32% after worsening freedom conditions. On the other hand, SCM estimates show a statistically significant increase for Hungary but not for Indonesia and Venezuela. More specifically, deteriorating freedom level of Hungary in 2011 increases the population of Hungarian students abroad by 25% compared to the pre-treatment period based on the SCM estimates.

In the literature, research on determinants of international student mobility generally has focused on socioeconomic factors. In addition to this, these studies generally have examined the host country-specific factors affecting student preferences instead of origin countries. In this thesis, we explore the causal impact of deteriorating freedom level in origin countries on the mobility of international students from these countries. Another contribution we provide to this literature is using the SCM to analyze the casual impact of a determinant of migration flows.

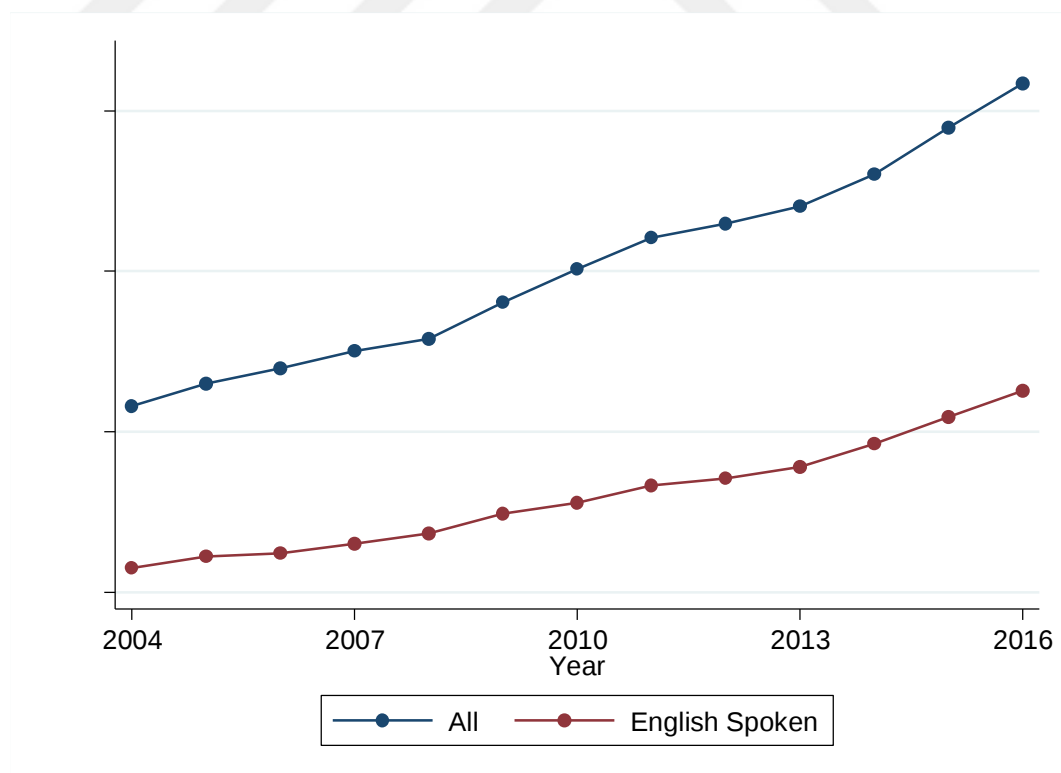
The thesis is organized under six sections. The next section provides overview of international student mobility and describes trends in the freedom index. Section III lays out relevant literature; Section IV specifies empirical strategy; Section V provides estimation results; and Section VI discusses the findings and concludes.

Section 2:

RESEARCH BACKGROUND**2.1 Trends in the Migration Patterns of International Students**

Over the years, in line with the increasing trend of globalization, student mobility between countries has increased. Figure 2-1 plots the enrollment of international students from 2004 to 2016 in 26 OECD members that have provided the relevant data. As shown in the figure, the number of international students in OECD countries increased by 80%, from 1.87 million to 3.38 million. The English-speaking countries, including the United States, the United Kingdom, Australia, Canada, and New Zealand, hosted a majority of students (59% of all students in the OECD in 2004 and 57% of them in 2016). But there has been a slightly slower growth (75%) between 2004 and 2016 in these countries with the decreasing importance of spoken language in student preferences.

Figure 2-1: Population of international students in OECD countries, 2004-2016.



Notes: English Spoken denotes the number of international students in the English-speaking countries including the United States, the United Kingdom, Australia, Canada, and New Zealand. All refers to international student numbers in 26 OECD members.

Among the OECD countries that host the most students, the United States, which hosts approximately 28% of the total international students in OECD members, comes to the fore and is followed by the United Kingdom, Australia, France, and Germany, respectively (Table 2-1). Another point to be considered here is the increase of heterogeneity in the distribution of international students to destinations. It is clearly seen in the data that all OECD countries start pulling students. While the proportion of the top 5 countries fell from 73% to 64.7% between 2004 and 2016, this decline was from 90.4% to 82.8% for the top 10 countries.

Table 2-1: Top 10 destination countries for international students.

Year 2004			Year 2016		
Countries of Destination	Number of International Students	Stock as % of Total	Countries of Destination	Number of International Students	Stock as % of Total
The United States	572,509	28.9%	The United States	971,417	27.9%
The United Kingdom	300,056	15.1%	The United Kingdom	432,001	12.4%
France	210,180	10.6%	Australia	335,512	9.7%
Germany	198,565	10.0%	France	268,946	7.7%
Australia	166,954	8.4%	Germany	244,575	7.0%
Japan	117,903	5.9%	Canada	189,478	5.5%
Canada	110,990	5.6%	Japan	158,271	4.6%
New Zealand	41,422	2.1%	Netherlands	94,908	2.7%
Italy	40,641	2.1%	Italy	92,655	2.7%
Austria	33,707	1.7%	Austria	89,107	2.6%

Notes: The statistics are based on OECD data. The data includes students who are foreign-born and migrate abroad for the purpose of education in 2004 and 2016.

Table 2-2 shows the distribution of top 10 origin countries observed in 2004 and 2016. The two countries that have sent the largest number of students are China and India, and they have clearly a great difference from other origin countries due to their large populations. These countries took the first two places respectively among those that send the most students to study in 2004 and 2016. They were followed by Germany, South Korea, and France. The international students sent by these 5 countries corresponded to 41% of the total students studying abroad in 2016. In the same period, the GDP per capita in China and India has increased by 279% and 191% respectively. That improvement has enhanced the population of international students originating from these countries as the

ability of parents to afford foreign education for their children increased in these countries.

Table 2-2: Top 10 origin countries of international students.

Year 2004			Year 2016		
Countries of Origin	Number of International Students	Stock as % of Total	Countries of Origin	Number of International Students	Stock as % of Total
China	319,508	17.1%	China	794,964	23.7%
India	119,029	6.4%	India	260,318	7.8%
South Korea	91,423	4.9%	Germany	118,511	3.5%
Japan	59,168	3.2%	South Korea	107,877	3.2%
Germany	55,319	3.0%	France	82,944	2.5%
Morocco	46,449	2.5%	Saudi Arabia	81,431	2.4%
France	46,386	2.5%	Vietnam	77,987	2.3%
Greece	40,384	2.2%	Italy	63,088	1.9%
Malaysia	38,696	2.1%	Ukraine	53,068	1.6%
The United States	38,139	2.0%	The United States	50,734	1.5%

Notes: The statistics are based on OECD data. The data includes students who are foreign-born and migrate abroad for the purpose of education in 2004 and 2016.

2.2 Trends in the Democracy Indices

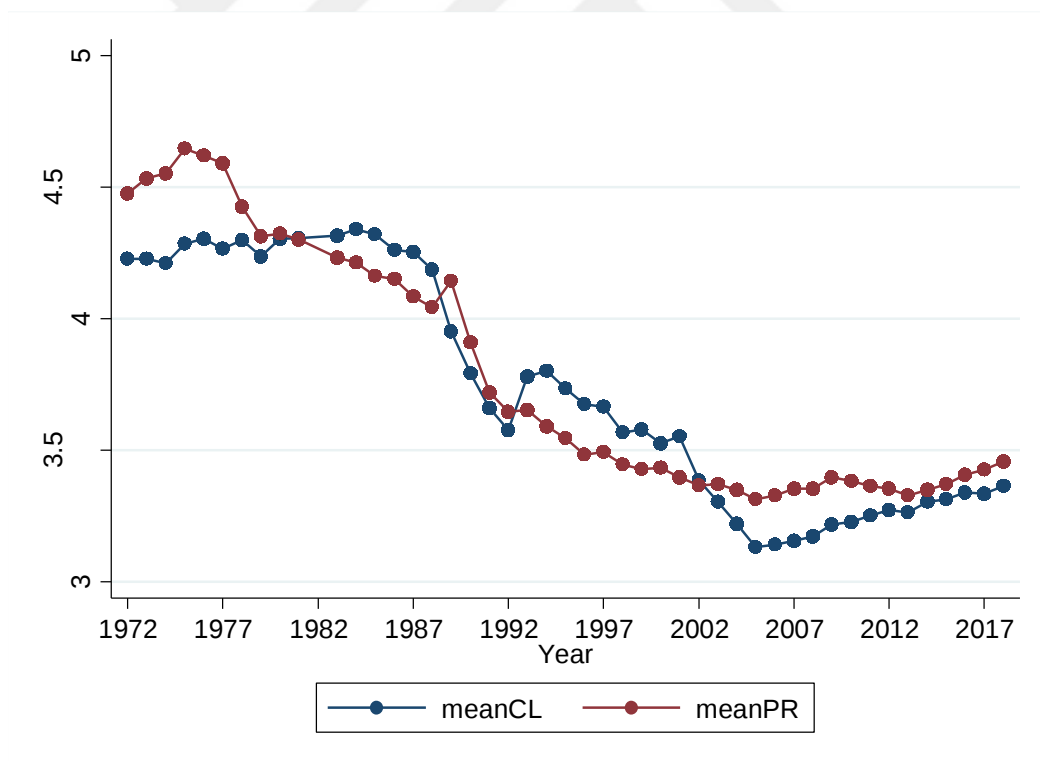
Freedom Index is an index that shows the democracy level of countries, reported by the Freedom House annually. More than 100 analysts and more than 30 expert consultants take part in the preparation phase of this report which is prepared in line with the Universal Declaration of Human Rights. The initial scoring made based on academic studies and field analysis is reviewed and discussed with the Freedom House personnel and expert consultants, and then the index values take its final form (Freedom House, 2019).

The Freedom House reports scores of two different indices from 1972 to 2018: political rights (PR) and civil liberties (CL). PR has three subtitles that are electoral process, functioning of government, and political pluralism and participation, while CL has four subcategories that are freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights. Measurement values from 1 (the highest degree of freedom) to 7 (the lowest degree of

freedom) are used for these indexes. Countries with the average of PR and CL index values between 1 and 2.5 are classified as “free” while those with the index value between 3 and 5 are “partly free”, and those with the average index between 5.5 and 7 are considered as “not free” by Freedom House.

Over the years, global developments in human rights and democracy has improved, and this improvement has also been reflected in the PR and CL indexes. The improvement had accelerated with the end of the communist regimes in the 90s. However, this improvement has left its place to deterioration after 2005 with the decrease of democratization globally on average. As shown in Figure 2-2, the civil liberty index, which began a slight upward trend after 2005, reached a global average of 3.36 in 2018, which rose from 3.13 in 2005. (As a side note, higher scores of the CL index means less democratic rights.)

Figure 2-2: Average global Civil Liberty (CL) & Political Rights (PR) index, 1972-2018.

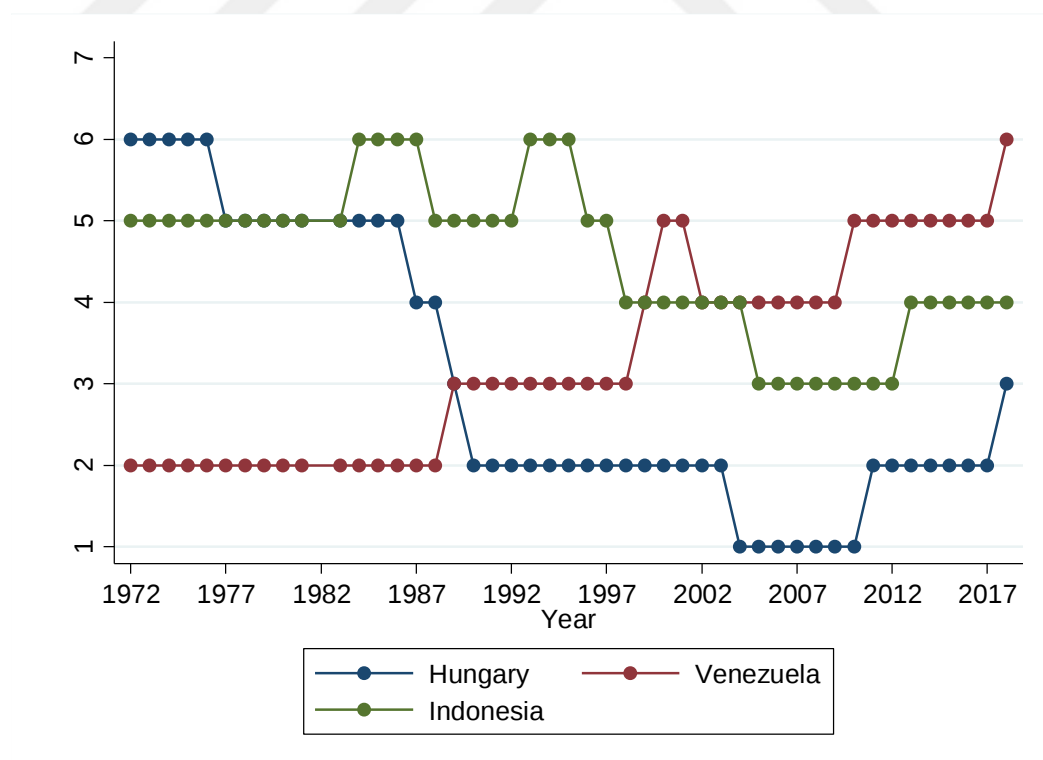


Notes: Countries with the average of PR and CL index values between 1 and 2.5 are classified as “free” while those with the average index value between 3 and 5 are “partly free”, and those with the average index between 5.5 and 7 are considered as “not free”.

In this study, we use the CL index because we believe that its components (freedom of expression and belief, associational and organizational rights, rule of law, personal autonomy and individual rights) reflect freedom conditions in daily life of citizens. Thus, changes in this index is more likely to affect the personal preferences of citizens regarding their future and migration decisions. When micro level data are analyzed, the results shown in Figure 2-3 indicate that countries such as Hungary, Indonesia, and Venezuela experienced major changes in their CL index values over time.

After 1989 when the communism ended and democracy began in Hungary, the CL index has displayed a major improvement. Similarly, there was a 4-point improvement in Indonesia after 1998, which is after the transition to democracy in the same year. Unlike these two countries, there was a 1-point deterioration in Venezuela in 1989 due to political and social crises. This deterioration continued with the election of Hugo Chavez in the 1998 elections and the index value increased to 5.

Figure 2-3: Civil Liberty (CL) index of Hungary, Indonesia, and Venezuela, 1972-2018.



Notes: Countries with the CL index values between 1 and 2.5 are classified as “free” while those with the index value between 3 and 5 are “partly free”, and those with the average index between 5.5 and 7 are considered as “not free”.

Although these countries have built more democratic institutions over time and mostly free elections are being held to determine who will govern the country, the level of democracy has started to deteriorate in the early 2010s. In this thesis, we focus on the 2004-2016 period when the CL index has slightly upward trend. Particularly, we analyze the effect of deterioration of freedom level on student mobility in Hungary, Indonesia, and Venezuela. We select them as treated countries due to their special conditions in this period. The first reason is that all these countries experienced only one change in freedom level between 2004 and 2016. The source of this deterioration is associated with the law amendments in 2009 for Venezuela, 2010 for Hungary and 2013 for Indonesia. The government in Hungary, which came to power with the 2010 elections, started to implement policies that prevent the activities of independent institutions and NGOs. Similarly, with the legislative change in Indonesia in 2013, the government started to control and intervene in NGOs. On the other hand, the referendum held in 2009 which led to the removing the restrictions on the term of office for the elected officials worsened the freedom level of Venezuela (Freedom House).

Secondly, we want to examine the effects of the deterioration at various levels of freedom, and the levels at these three countries are different from each other. Freedom level of Hungary was 1 while the level of Indonesia was 3 and the level of Venezuela was 4 before the deterioration in freedom has started. In addition to these criteria, sufficient population of international students originating from treated countries is required to obtain meaningful results, and these three countries also meet that condition.

Section 3:

LITERATURE

In the literature, there are studies examining student migration with differences in socio-economic factors and educational policies of countries. Generally, student migration to developed destination countries are examined in these studies. Also, determinants of student mobility are mostly explored by the Ordinary Least Squares (OLS) and Panel Fixed Effect regression approaches.

One of the studies analyzing developed host countries, Kahanec and Kralikova (2011), examines determinants of student mobility to OECD members, including the United States and European countries. They find that the quality of education and the English as the language of schools in host countries are positively related to student flows. Similarly, Beine, Noel and Ragot (2014) point out that the quality of universities in OECD countries has a positive effect on student preferences. This study also reveals that while student network affects migration positively, the effect of distance between countries is negative. Unlike the earlier literature, Caruso and Wit (2015) analyze the intra-European student movement, and their paper indicates that student migration to host countries increases with respect to expansion of expenditures on education in the host country. Another study exploring the motivation of student migration for OECD countries by Abbot and Silles (2016) notes that income per capita of destination country has positive effect on student mobility. Moreover, the effect of time difference on student migration is examined in this study, and it is found out that increase in time zone differences affects student preferences negatively. In addition to these studies, Thomas and Inkpen (2017) finds that increases in GDP per capita and youth population size of origin country have a positive effect on students flows to the United States.

Unlike these studies, Wei (2013) explores both developed and undeveloped destination countries and finds that trade volume between countries fosters student mobility significantly. He also reveals that higher education expenditures as percentage of GDP in destination countries increase student flows to these countries. Besides that, Kaushal and Lanati (2019) point out that bilateral trade and co-ethnic or co-national population (diaspora) in destination country accelerates student movement to OECD and non-OECD countries.

This thesis contributes to this literature by exploring the causal impact of deteriorating freedom level in origin countries on the outflow of international students from these countries. In a relevant research, Bessey (2010) points out that worsening freedom level in origin countries impedes student migration to Germany from that country. In another related paper, Kaushal and Lanati (2019) find that quality of governance in origin country has positive effect on student outflow to English speaking host countries from non-OECD countries. Our study differs from these papers as we analyze the causal effect of freedom instead of using it as a control variable.

Another contribution that this research provides to this literature is the method. In addition to the difference-in-differences approach, we use the Synthetic Control Methods (SCM) developed by Abadie and Gardeabazal (2003) and Abadie (2019). With this research method, we aim to find a better comparison unit to obtain robust causal estimates.

Section 4:

EMPIRICAL STRATEGY

In this section, we explain the empirical strategy that is used to analyze how the freedom level (CL) of origin countries affects student migration. For that purpose, we apply two estimation techniques: Difference-in-Differences (DD) and the Synthetic Control Method (SCM).

4.1 Difference-in-Differences

Difference-in-Differences (DD) is a method that is used to estimate the treatment effect on treated unit by comparing the difference between pre and post treatment period outputs between treated and controlled units. In a simple way, let $\Delta_{Treated}$ be the pre and post period difference of the dependent variable in the treated unit and let $\Delta_{Control}$ be the pre and post period difference of the dependent variable in the controlled unit. And then taking the difference between $\Delta_{Treated}$ and $\Delta_{Control}$ gives the effect of the treatment on the treated unit. To estimate such an effect in a regression setup, we estimate the following linear DD regression specification

$$(1) \quad \ln y_{it} = \beta_0 + \beta_1 \ln gdp_{it} + \beta_2 \ln youth_{it} + \beta_3 unemp_{it} + \beta_4 PostTreat_{it} + \lambda_i + \lambda_t + \varepsilon_{it}$$

where y_{it} denotes the total population of international students originating from the country i at time t , gdp_{it} denotes the GDP per capita in country i at time t , $youth_{it}$ is the youth population (aged 20-24) in country i at time t , $unemp_{it}$ is the youth (aged 15-24) unemployment rate of the country i at time t . The variables starting with the notation of $\ln$ are calculated by taking the natural logarithm of the associated variable. The parameter $PostTreat_{it}$ is the post treatment period dummy variable for treated country i , which takes the value of 1 in the treated country i after the treatment in that country. The variable λ_i denotes the country specific fixed effect and λ_t time specific fixed effect. Since we examine the causal effect of freedom level deterioration on student mobility, the key coefficient of interest is the variable of $PostTreat$. In application, the treatment year is taken as the first year when the deterioration in the freedom index was observed. It means that the treatment year is 2011 for Hungary, 2013 for Indonesia and 2010 for Venezuela.

As pointed out by Bertrand et al. (2004), the error terms of each unit might be correlated with each other over time in the application of most difference-in-differences

setups. To account for the relationship between the error terms within a particular unit over time, we run the specification (1) by clustering standard errors at the country-level since the units are countries in our application.

We include the GDP and youth unemployment in regressions to control for changes in local economic conditions and affordability of foreign education, whereas we include youth population to control for the demand for local slots in higher education. As a robustness check, we also explore the sensitivity of results by adding variables of youth population (aged 15-19), total unemployment rate, and a dummy variable for European Union membership which takes the value of one after the EU membership of the country to specification (1). Other variables, such as the quantity of enrollment slots in universities of each country or educational expenditures on higher education might be also relevant to explain the outmigration of students. Unfortunately, the data of these variables are not available for the full list of countries used in the analysis. Thus, they are not included in the regression analysis.

To obtain the causal effect of the treatment with the difference-in-differences approach, several conditions must be satisfied. First, the treatment needs to be exogenous, and it should not affect the dependent variable in the comparison units. Second, the output of interest would have similar trend over time between the treated and control unit in the absence of treatment (i.e., the parallel trend assumption). To satisfy these conditions, we use neighboring countries of treated countries that have similar characteristics as control units. In particular, the control countries that we take are Slovakia, Romania, Croatia, Slovenia, Bulgaria, Poland, and Greece for Hungary; Malaysia, Philippines, Vietnam, Cambodia, Laos, Myanmar, Bangladesh, Nepal, and Bhutan for Indonesia; Argentina, Bolivia, Trinidad and Tobago, Paraguay, Peru, and Uruguay for Venezuela.

In regarding the first condition, the deterioration in freedom in the analyzed origin countries can be considered as an exogenous event because it was resulted from closely finalized election results as discussed in Section 2. Also, unlike the refugee flows, none of these analyzed changes in freedom conditions created social turbulences in a way that it affected conditions in neighboring countries because of the outmigration at least in the analyzed sample period in this study (i.e., until 2016). As a related condition, the outcome of treated and control countries needs to be unaffected by any other change that is different from the treatment and is realized in the year of worsened freedom conditions. While there is no noticeable change for Venezuela and Indonesia as well as their

neighbors around the treatment year, the EU membership status of some neighbors of Hungary has changed within the sample period and it might be a factor facilitating student movements. Therefore, we control for the EU membership for these countries with a dummy variable which takes the value of one after the membership year.

To satisfy the other condition for obtaining causal relation in DD estimates, the outmigration of students from neighboring countries should follow a parallel trend to the outmigration of students from the treated country before the treatment. Since geographically closer countries are likely to share some common socioeconomic factors and similarly distanced to popular destination hubs, their patterns of student migration are likely to be similar to the treated country. The validity of the parallel trend assumption is evaluated later in detail by providing relevant sample statistics and figures of the student migration in treated and control countries.

4.2 Synthetic Control Method

In addition to the Difference-in-Differences strategy, we use the Synthetic Control Method (SCM) developed by Abadie and Gardeazabal (2003) and Abadie et al. (2010) to measure the causal impact of the freedom index on student mobility. The aim of this method is to construct a synthetic control unit for each treated country by weighting potential control countries in such a way that the synthetic unit has a similar behavior to the treated country before the treatment.

Unlike DD method that gives equal weights to each country in the arbitrarily selected control group, the SCM gives more weight to control countries that are more similar to the treated country and by giving less weight to the others. Thus, systematically determining the control unit, the SCM allows us to reach more robust results about the treatment effect on the treated country.

The synthetic matching methodology work as follows in a setup where $I+1$ units exist.

We estimate

$$(2) \quad \hat{Y}_{1t}^D = \sum_{i=2}^{I+1} w_i Y_{it}$$

and

$$(3) \quad \hat{\vartheta}_{1t} = Y_{1t} - \hat{Y}_{1t}^D$$

The first country ($i=1$) refers to the treated country, and $\hat{Y}_{1t}^D$ is the student mobility from the treated country in time t that would have been observed without treatment. w_i denotes weight of control country i , Y_{it} denotes student mobility from control country i in time t , and $\hat{\vartheta}_{1t}$ denotes the effect of treatment on treated country in time t .

From equation (2) and (3), it is concluded that determining the weights (w) has an important place to estimate treatment effect in the SCM. Abadie and Gardeazabal (2003) and Abadie et al. (2010) propose to use $p=1, 2, \dots, P$ number of predictor variables of countries to construct similar synthetic control unit to treated country in terms of the behavior of pre-treatment period. To construct a synthetic control unit that matches to treated country's pre-treatment period in the best possible way, the SCM minimizes

$$(4) \quad \left(\sum_{p=1}^P k_p (X_{p1} - w_2 X_{p2} - \dots - w_{I+1} X_{pI+1})^2 \right)^{1/2}$$

subject to $\sum_{i=2}^{I+1} w_i = 1$ and $w_2, \dots, w_{I+1} \geq 0$

where k_p is non-negative constant of predictor variable p and the vector X_{pi} is predictor variable p 's value for country i . With different set of weights $K=(k_1, \dots, k_p)$ of predictor variables, we construct different synthetic control country. To clarify this situation at this point, the SCM estimates K and W (i.e., $w_2, \dots, w_{I+1}$) jointly by minimizing

$$(5) \quad \sum_{t \in \mathcal{T}_0} (Y_{1t} - w_2(K)Y_{2t} - \dots - w_{I+1}(K)Y_{I+1t})^2$$

for some $\mathcal{T}_0 \subseteq (1, 2, \dots, T_0)$ of pre-treatment periods.

After constructing a synthetic match by these estimations, we test statistical significance as Abadie et al. (2010) by taking the ratio of the post-treatment match to the pre-treatment match. We estimate the root mean squared prediction error (RMSPE) as follows

$$(6) \quad R_i(t_1, t_2) = \left(\frac{1}{t_2 - t_1 + 1} \sum_{t=t_1}^{t_2} (Y_{it} - \hat{Y}_{it}^D)^2 \right)^{1/2}$$

for $0 \leq t_1 \leq t_2 \leq T$

where $R_i(t_1, t_2)$ denotes the quality of match between time t_1 and t_2 for country i . And the ratio of post-treatment RMSPE to pre-treatment RMSPE is

$$(7) \quad r_i = \frac{R_i(T_0+1, T)}{R_i(1, T_0)}$$

where T_0 is treatment time and T is the end of the observed period. Then we rank countries' r_i values from the largest to the smallest, and we estimate

$$(8) \quad \rho = \frac{\check{R}_1}{I+1}$$

where ρ is the p-value of the treated unit, and $\check{R}_1$ denotes the rank of r_1 among all values of r .

In application, we use GDP per capita, youth unemployment, and youth population (aged 20-24) as control variables (i.e., X in the notation above). We choose the potential donor countries as those where the freedom index has been stable during the 2004-2016 period. The next section describes the selection of the donor countries in detail.



Section 5:

DATA

In this section, we describe the data compiled from several sources to conduct the empirical analysis. We obtain data of international students from OECD, freedom index from the Freedom House, and some country-specific explanatory variables from the World Bank.

5.1 *The Sample of Destination Countries*

The information of the total population of international students who are studying in each OECD country is collected by OECD. The statistics of student population might be reported under three categories in the OECD data: the population of “foreign”, “non-citizen”, and “non-resident” students. All students who are admitted to a higher education program in a country that is different than their origin country is referred by category of “foreign”. The category of “non-citizen” refers to students who pursue the education without holding citizenship from the destination country. Both categories of the “foreign” and “non-citizen” students include students who have migrated at a minor age to the country of education as a result of the decision of their families. If such students have obtained their citizenship before starting their higher education, then they should not be included in the category of “non-citizen”, but they might be included in “foreign” category. On the other hand, the category of “non-resident” refers to students who come to the country solely for the purpose of pursuing their higher education. Since this study analyzes how changes in civil liberties in origin countries affect the decision of pursuing international education, the population of “non-resident” students are preferred to be used in the empirical analysis.

26 OECD countries reported some data of international students in the 2004-2016 period. The reported type of categories varies from country to country, and the “non-resident” category is not available for all countries. For instance, some countries reported the statistics only for “non-citizen” students. Some countries even changed the type of the reported category within the analyzed period. For instance, French government reported the statistics for “non-citizen” students until 2012 and then started reporting the statistics for “non-resident” students. Therefore, we have to make some inference to come up with

a consistent measure of the population of students who migrate solely for the purpose of pursuing higher education.

We also need the reliable information of the origin country of students. To judge the quality of available origin-level information, we plot the data for each destination and origin pair and identify cases where there is a large change in the population of students from a particular origin country across years observed in the data. Then, we compare these peculiar statistics to student mobility data from UNESCO. We conclude that the origin-level data for Belgium, Slovak Republic, Norway, Portugal, Spain, Sweden, and Turkey as destination countries have some inconsistencies over time as the statistics for these countries contradict with the UNESCO data. Thus, we removed these destination countries from the analysis. We also removed Hungary as the destination country because it is the origin country of interest where the freedom index has deteriorated.

Among the remaining 18 OECD countries that make up our sample of destination countries, Australia, Denmark, New Zealand, Switzerland, the United Kingdom and the United States reported statistics only for “non-resident” students throughout the whole period. So, we use the data for these countries without needing any inference. Canada also reported the statistics for “non-resident” students, but they did not report anything for the year 2005. We inferred the missing statistics in 2005 for each origin country in Canada as the average of the corresponding statistics for each origin country from 2004 and 2006.

Czech Republic, Iceland, Italy, and South Korea reported statistics only for “non-citizen” students throughout the 2004-2016 period. For these countries, we used data of “non-citizen” students to capture the stock of international students. Except Italy, none of these countries host large population of immigrants. Therefore, we can claim that most “non-citizen” students in these countries are actually “non-resident” students.

The other countries in the sample have changed the type of reported students over time. The challenge is to construct the series of the population of “international students” as consistent as possible over time for these countries. More specifically, Austria, Netherlands and Poland reported the statistics for “non-citizen” students between 2004 and 2012, separately for “non-resident” and “non-citizen” students in 2012, and for “non-resident” students after 2012. For these countries, we first calculate the difference between “non-citizen” and “non-resident” students in 2012, which shows the total number of students who have obtained a residency status in the destination country as of 2012.

Then, we assume that the number of resident students from each origin country in 2012 stays the same for the following years in Austria, Netherlands, and Poland. Using that assumption, we add the total number of observed “non-resident” students to the inferred number of resident students such that we have a consistent series of the population of “non-citizen” students in these countries between 2004 and 2016.

On the other hand, France, Japan, and Finland reported statistics for “non-citizen” students between 2004 and 2012 and “non-resident” students after 2012. We assume that the observed population of “non-resident” students in 2013 is the same with the population of “non-resident” students in 2012. Then, having some information about the population of “non-citizen” and “non-resident” students for 2012, we construct the population of “non-citizen” students in the post-2012 period by following the method adopted in the case for Austria, Netherlands and Poland. Lastly, Germany and Switzerland reported statistics for “foreign” students until 2007 and then for “non-resident” students. We use statistics for “foreign” students as a proxy for statistics for “non-resident” students in the 2004-2007 period for these countries.

Before providing some summary statistics for the sample, we should also note that international student data of some years for some destination-origin pairs have been missing although these countries belong to our sample. For such cases, we infer the missing information as the average of the closest available non-missing years. In particular, we infer the population of students from Jordan to Italy in 2008, from Myanmar to United Kingdom in 2013, from Qatar to Australia in 2013, from Cyprus to United Kingdom in 2013 and 2016, from Maldives to Australia in 2013, and from Latvia to all destination countries in 2012.

As a result, the destination sample consists of 18 OECD countries, including Australia, Austria, Canada, Czech Republic, Denmark, Finland, France, Germany, Iceland, Italy, Japan, South Korea, Netherlands, New Zealand, Poland, Switzerland, United Kingdom, and United States. As displayed in Table 5-1, total number of students who study for higher education in these 18 OECD countries was 1,772,119 students in 2004 and 3,495,453 students in 2016. The population of students in these countries in the destination sample made up 95% of total international students in 2004 among 26 OECD countries that reported the statistics for the 2004-2016 period and 92% in 2016. Thus, we can claim that our sample covers very large majority of students in OECD countries.

Table 5-1: The number of international students in the sample.

Origin Countries	Destination Countries	Number of International Students in 2004	Number of International Students in 2016
All	26 OECD Countries (All)	1,772,119	3,495,453
All	18 OECD Countries (Sample)	1,681,044	3,217,903
Control Countries	18 OECD Countries (Sample)	482,477	863,926
3 Treated Countries	18 OECD Countries (Sample)	115,411	197,095

Notes: 18 OECD countries include Australia, Austria, Canada, Czech Republic, Denmark, Finland, France, Germany, Iceland, Italy, Japan, South Korea, Netherlands, New Zealand, Poland, Switzerland, United Kingdom, and United States. Treated countries are Hungary, Indonesia, and Venezuela.

5.2 *The Sample of Origin Countries*

For the reasons explained in Section 2, this study analyzes Hungary, Indonesia, and Venezuela as countries of interest where the freedom has deteriorated. In the terminology of the Synthetic Control Method (SCM) as described above, these countries are the treated units. The SCM requires to construct a synthetic unit by assigning weights to existing units in a donor pool such that the synthetic and treated units will have a similar trend in their dependent variable. In selecting the donor pool, Abadie (2019) suggests using similar units to the treated unit.

We start constructing the donor pool by identifying all countries that are located in Europe, America, or Asia because the treatment units in our context are from these continents. In total, there are 114 countries other than Hungary, Indonesia, and Venezuela in these continents after including Australia and New Zealand. Among those countries, United States, United Kingdom, France, Germany, Canada, Japan, and Australia has been major destination countries for international students. So, we exclude these countries from the donor set of origin countries. We also exclude Hongkong, Singapore, Palestine, and Puerto Rico from the sample because the freedom index is not observed for them, whereas we exclude Taiwan and Timor-Leste due to the lack of data of international students for the 2004-2016 period. We also exclude Serbia, Montenegro, and Kosovo because their territories have changed in the 2004-2016 period.

We also excluded China from the donor set because the capacity of Chinese parents to pay for foreign education and the openness of the country has changed considerably in

the analyzed period. Also, China differs noticeably from most other countries because of the size of its population. On the other hand, government of Brazil, Ecuador, Kuwait, and Saudi Arabia have started very generous funding programs for studying abroad in the 2004-2016 period. These countries are excluded from the donor set as well. We also excluded 10 countries including Andorra, Bahamas, Bhutan, Belize, Brunei, Guyana, Maldives, Malta, Suriname, and Monaco whose population is less than one million because the determinants of international student outflows from these small countries might be different compared to large countries. Indeed, almost each of these small countries has special connections with one large destination country, and the size of outflow of international students from these small countries might be highly dependent on the conditions in that destination country.

After these eliminations, 83 countries have left as a potential donor country. In 54 of them, the freedom index has stayed stable during the 2004-2016 period, whereas the index has changed in the remaining ones. We restrict the donor set to countries that have a stable freedom index because we want to identify the causal impact of the deteriorating freedom conditions in Hungary, Indonesia, and Venezuela. If we were to use other origin countries where the freedom index has changed as well, we would have not separately identified whether the relative changes in the outflow of students from Hungary, Indonesia, and Venezuela stem from deteriorating freedom in these countries or due to the changing freedom conditions in the other control countries. As shown in Table 5-1, the total number of students that come from the origin countries in the sample of donor set to 18 OECD destinations is 482,477 in 2004 and 863,926 in 2016. The population of these students make up respectively 27% in 2004 and 25% in 2016 of all international students who are studying in these countries.

5.3 Control Variables

We use GDP per capita, size of youth (aged 20-24) population, and youth unemployment rate as country-specific explanatory variables from the World Bank. As shown in Table 5-2 below, among the treated countries, Indonesia is classified as lower-middle economy with its lowest GDP per capita while the others are high-income economies. Venezuela has the lowest rate of youth unemployment as another economic indicator, while Indonesia is distinguished by the large number of its youth population.

Table 5-2: Control variables.

Origin Country	Variable	Obs	Mean	Std. Dev.	Min	Max
Hungary	GDP Per Capita	13	13645.4	710.02	12574.7	15114.4
	Youth Unemployment Rate	13	21.1	5.1	12.9	28.2
	Youth Population	13	635.02	26.26	609.8	703.4
Indonesia	GDP Per Capita	12	3219.8	480.3	2524.2	3968.1
	Youth Unemployment Rate	12	18.7	3.6	15.2	25.8
	Youth Population	12	20900	282.8	20400	21400
Venezuela	GDP Per Capita	13	13568.1	1261.4	10984.3	14920.5
	Youth Unemployment Rate	13	15.9	3.21	12.3	25.2
	Youth Population	13	2559.9	93.93	2383.3	2658.5
Control Countries (SCM)	GDP Per Capita	728	20059.9	21035.2	550	91565.7
	Youth Unemployment Rate	728	16.4	11.4	0.45	64.63
	Youth Population	728	3632	15200	21.8	120000
Neighbors (Hungary)	GDP Per Capita	91	15353.3	6893.3	5152.4	30054.9
	Youth Unemployment Rate	91	26.3	10.1	10.1	58.2
	Youth Population	91	889.4	914.2	103.7	3321.4
Neighbors (Indonesia)	GDP Per Capita	108	2196.6	2663.5	500.2	11244
	Youth Unemployment Rate	108	5.68	3.79	1.36	12.46
	Youth Population	108	4861.2	4527.9	68.3	14900
Neighbors (Venezuela)	GDP Per Capita	78	8174.2	4997.5	1657.5	17064.5
	Youth Unemployment Rate	78	12.59	7.49	3.31	33
	Youth Population	78	1321.79	1248	95.1	3544.50

Notes: The World Bank data are used for tabulations in this table. Unlike Venezuela and Hungary, the period 2005-2016 is analyzed for Indonesia due to change in CL value in 2004. Statistics of the treated and the control countries are displayed separately. Youth population is displayed in thousand. GDP per capita is denoted by US\$.

As we mentioned in DD empirical strategy part, we use neighboring countries of treated countries as controlled units to have similar countries in the analysis and to satisfy the parallel trend assumption. As shown in the table, sample statistics of the explanatory variables are similar between the treated countries and their neighbors. For instance, the GDP per capita is the lowest for the neighboring countries of Indonesia, and that average amount is similar to the GDP of Indonesia which is considerably lower than the GDP of

other treated countries. Similarly, the highest youth unemployment rate is observed for the neighbors of Hungary, and that rate is consistent with the high unemployment rate of Hungary. Also, youth population in treated countries is in the range of the youth population of their control countries, with the exception of Indonesia where it has more crowded cohorts compared to their neighbors.



Section 6:

RESULTS

In this section, we explain the estimation results under two parts: Difference-in-Differences and Synthetic Control Method.

6.1 *Difference-in-Differences*

The key regression results are shown in Table 6-1 below. The coefficient in each cell measures the marginal effect of variables, including PostTreat, GDP per capita, youth population (aged 20-24), youth unemployment rate, youth population (aged 15-19), total unemployment rate and EU membership on student mobility from the treated and controlled countries. The coefficient estimate associated with the variable of PostTreat shows the effect of the deterioration in the freedom index on student mobility in the post-deterioration period in terms of logarithm units (i.e., approximately in term of percentages). As mentioned in Section 4, standard errors are clustered at the country level in each specification presented in Table 6-1 below. Also, figures of the logarithm of countries' population of students abroad for each treated country and their neighbors are provided to help with the visual judgement of the parallel trend assumption.

Difference-in-differences estimation results for the treated countries of interest are separately discussed below.

Table 6-1: Difference-in-differences estimation results.

	Hungary			Indonesia			Venezuela		
	S1	S2	S3	S1	S2	S3	S1	S2	S3
PostTreat	0.147 (0.106)	-0.034 (0.105)	-0.058 (0.206)	-0.233** (0.074)	-0.0924 (0.111)	-0.127 (0.136)	0.353** (0.097)	0.326* (0.167)	0.394* (0.194)
Logarithm of GDP per capita	-	0.635 (0.77)	0.487 (1.164)	-	0.135 (0.844)	0.045 (0.82)	-	0.138 (0.705)	0.147 (0.713)
Logarithm of Youth (Aged 20- 24) Population	-	1.303** (1.059)	1.445 (1.275)	-	-0.062 (0.772)	0.055 (0.739)	-	1.252** (0.44)	1.075 (1.238)
Youth Unemployment Rate	-	0.0018 (0.0078)	0.016 (0.02)	-	0.0318* (0.015)	0.06* (0.028)	-	0.034** (0.012)	-0.0001 (0.022)
Logarithm of Youth (Aged 15- 19) Population	-	-	-0.014 (0.706)	-	-	-0.412 (0.865)	-	-	0.28 (0.978)
Total Unemployment Rate	-	-	-0.028 (0.033)	-	-	-0.087 (0.103)	-	-	0.074 (0.06)
EU Membership	-	-	-0.073 (0.166)	-	-	-	-	-	-
Constant	7.58*** (0.121)	-15.46* (17.925)	-15.995 (34.275)	11.113*** (0.073)	10.417 (16.171)	15.6 (18.681)	8.841*** (0.04)	-7.957* (3.926)	-9.269* (4.295)
Observations	104	104	104	120	120	120	91	91	91
R ²	0.973	0.978	0.979	0.992	0.993	0.993	0.979	0.989	0.99

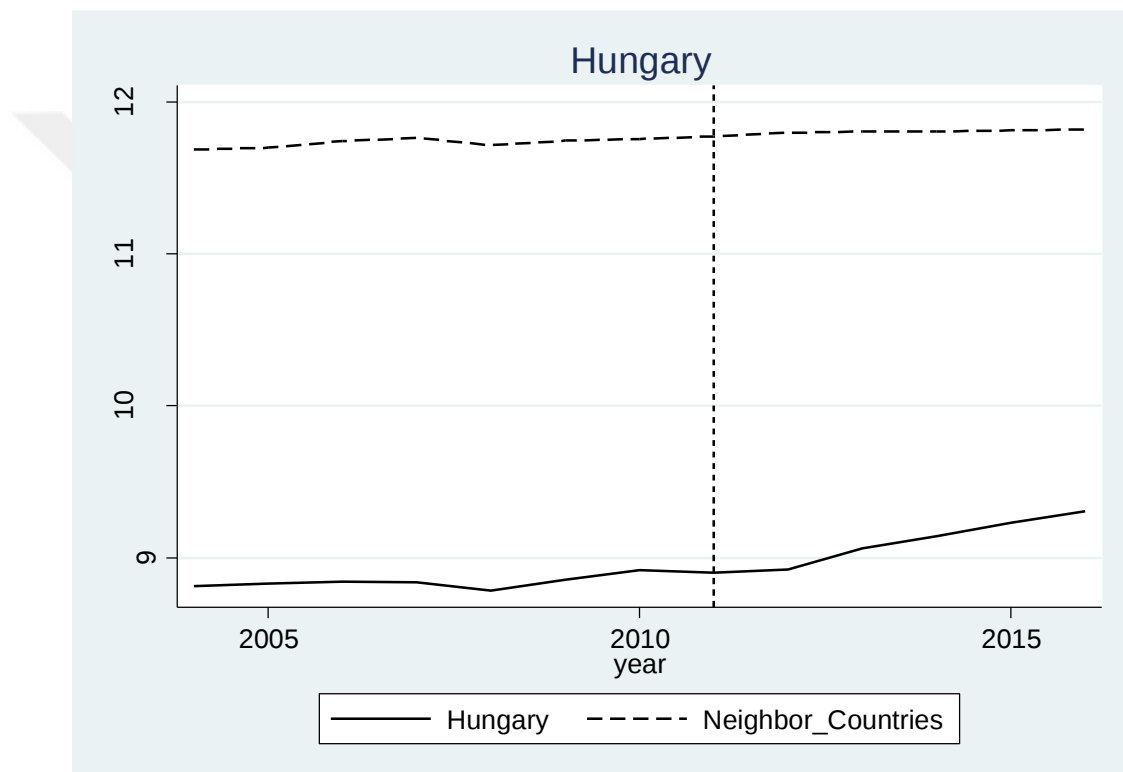
Notes: Estimation results are shown in columns separately for each treated country and its neighbors. Each column shows results from different specifications. The specification in the column of S1 includes country fixed effects and year fixed effects. The specification in the column of S2 includes variables logarithm of GDP, logarithm of youth population (aged 20-24) and youth unemployment rate in addition to country fixed effects and year fixed effects. The specification in the column of S3 includes variables logarithm of youth population (aged 15-19) and total unemployment rate in addition to country fixed effects, year fixed effects and variables of S2. In addition to these variables, S3 contains variable of EU Membership for only Hungary which takes the value of one after the membership year of Hungary and its neighbors. Dependent variable is logarithm of countries' population of students abroad for all specifications. Unlike Venezuela and Hungary, the period 2005-2016 is analyzed for Indonesia due to change in CL value in 2004. Standard errors in the parenthesis are clustered by country-level. ***Significant at 1%, **Significant at 5%, *Significant at 10%.

6.1.1 Hungary

There is no significant effect of deteriorating freedom level on student preferences in Hungary with all three specifications in Table 6-1 above. As shown in Figure 6-1

below, Hungary's student mobility resembles to its neighbors in pre-treatment period which satisfies the parallel trend assumption to obtain causal effect. Also, the trend of the international student mobility visually differed in Hungary in a way that it increased more compared to outmigration of students from Hungary's neighbors. Despite this visual evidence, regressions do not provide statistical differentiation in the outmigration of students from Hungary.

Figure 6-1: Student mobility trend from Hungary and its neighbors, 2004-2016



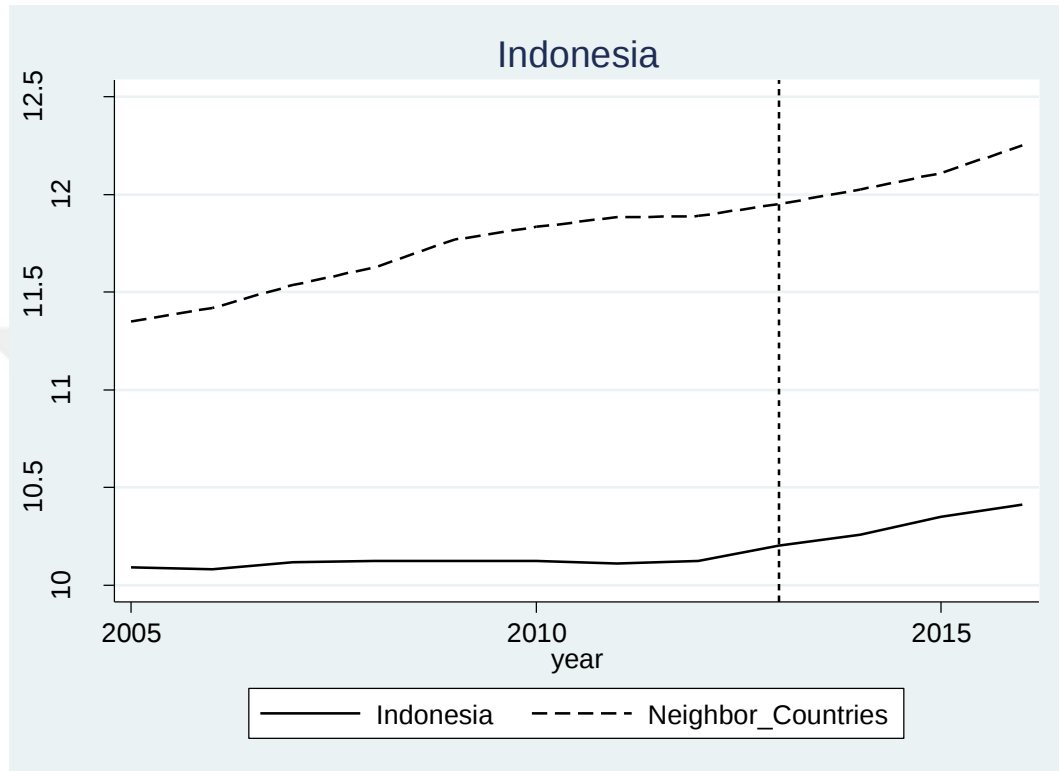
Notes: International Students represents logarithm of countries' population of students abroad. Countries in the control unit (neighbor countries) are Bulgaria, Croatia, Greece, Poland, Romania, Slovakia, and Slovenia.

6.1.2 Indonesia

Deteriorating freedom level in Indonesia has significant coefficient only with the first specification. But contrary to expectations, freedom level deterioration affects negatively the number of Indonesian students abroad by 23% compared to its neighbors. However, this effect disappears when the set of explanatory variables is included in regression. As shown in Figure 6-2 below, Indonesia's student mobility does not resemble to its

neighbors in pre-treatment period, and it violates the parallel trend assumption of difference-in-differences mentioned in the empirical strategy part.

Figure 6-2: Student mobility trend from Indonesia and its neighbors, 2005-2016



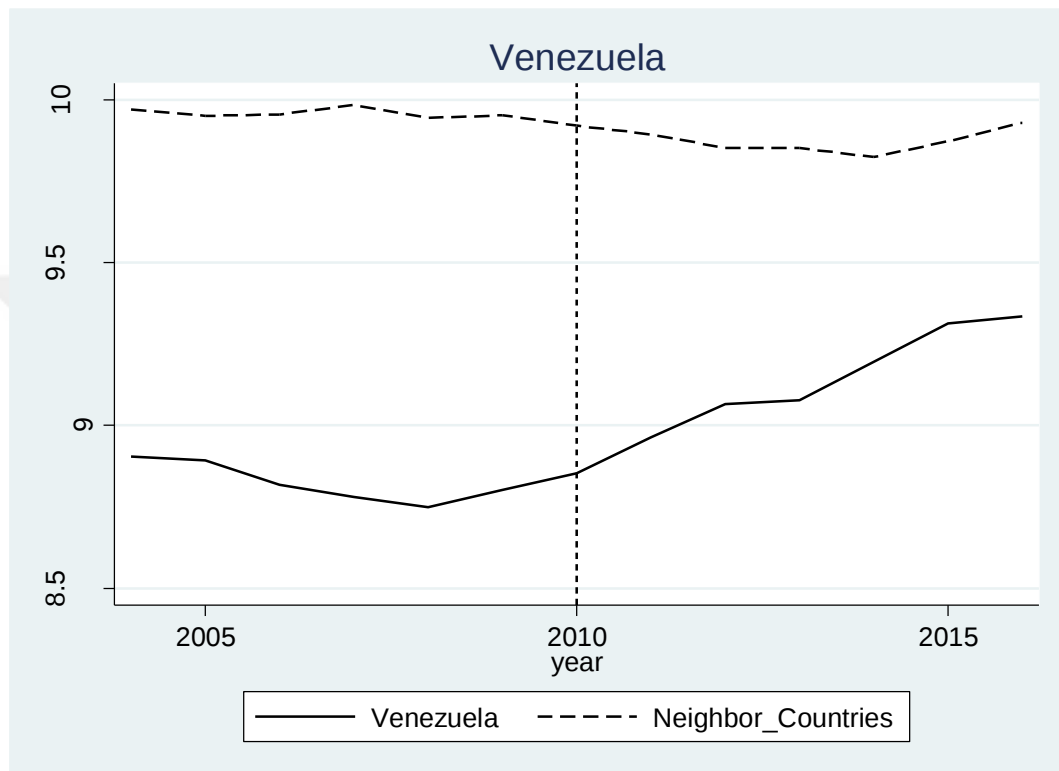
Notes: International Students represents logarithm of countries' population of students abroad. Countries in the control unit (neighbor countries) are Bangladesh, Bhutan, Cambodia, Laos, Malaysia, Myanmar, Nepal, Philippines, and Vietnam. Unlike Venezuela and Hungary, the period 2005-2016 is analyzed for Indonesia due to change in CL value in 2004.

6.1.3 Venezuela

Unlike Hungary and Indonesia, deteriorating freedom level in Venezuela has a positive and significant effect in all three regression specifications. Deterioration of civil liberties in Venezuela increases the population of Venezuelan students abroad by 35% compared to Venezuela's neighbors in the first specification, and this effect decreases to 33% in the second specification and increases to 39% in the third specification. As shown in Figure 6-3 below, the pre-treatment trend in Venezuela and its neighbors have been stable and similar, with the exception of the outmigration of students from Venezuela indicating a little fluctuation. However, the outmigration of students increases noticeably in Venezuela after the deterioration of freedom, whereas that for its neighbors stayed

stable. This visual evidence of differentiation in the trends after the treatment is consistent with the regression output indicating statistically significant increase in student migration from Venezuela after worsening civil liberties.

Figure 6-3: Student mobility trend from Venezuela and its neighbors, 2004-2016



Notes: International Students represents logarithm of countries' population of students abroad. Countries in the control unit (neighbor countries) are Argentina, Bolivia, Paraguay, Peru, Trinidad and Tobago, and Uruguay.

6.2 Synthetic Control Method

In this part, we present estimates from the Synthetic Control Method, which allows us to construct a donor unit similar to treated unit in a systematic way. Due to the variation in characters of Hungary, Indonesia, and Venezuela, we used different donor country sets for each as described below. From these sets, donor units were constructed by CL, GDP per capita, youth unemployment and youth population (aged 20-24) as the control variables. The dependent variable of interest is the ratio of yearly student numbers to the average population of students in the pre-treatment period.

The results of treated countries are discussed separately as follows.

6.2.1 Hungary

Hungary's CL value increased to 2 in 2011, therefore we take its treatment year as 2011 in our estimation. The donor pool consists of 34 control countries that have a stable CL value of 1 or 2 between 2004 and 2016. The list of these countries include Argentina, Austria, Belgium, Belize, Bulgaria, Chile, Costa Rica, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Iceland, Ireland, Israel, Lithuania, Mongolia, Netherlands, New Zealand, Norway, Panama, Poland, Portugal, Romania, Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, Trinidad and Tobago, and Uruguay. With the donor pool and variables mentioned before, the estimated synthetic cohort for Hungary consists of Costa Rica with 0.312 weight, Uruguay with 0.308 weight, Poland with 0.076 weight, Chile with 0.072 weight, Estonia with 0.058 weight, Slovak Republic with 0.05 weight, Czech Republic with 0.019 weight, Portugal with 0.015 weight, Slovenia with 0.013 weight, Spain with 0.01 weight, Cyprus with 0.009 weight, New Zealand with 0.008 weight, Austria, Belgium, Finland and Iceland with 0.006 weight, Ireland, Netherlands and Sweden with 0.005 weight, Denmark with 0.004 weight, Norway and Switzerland with 0.003 weight. With this constructed synthetic match, we found statistically significant positive effect (Table 6-2) on student mobility from Hungary after the freedom conditions got worse in Hungary in 2011.

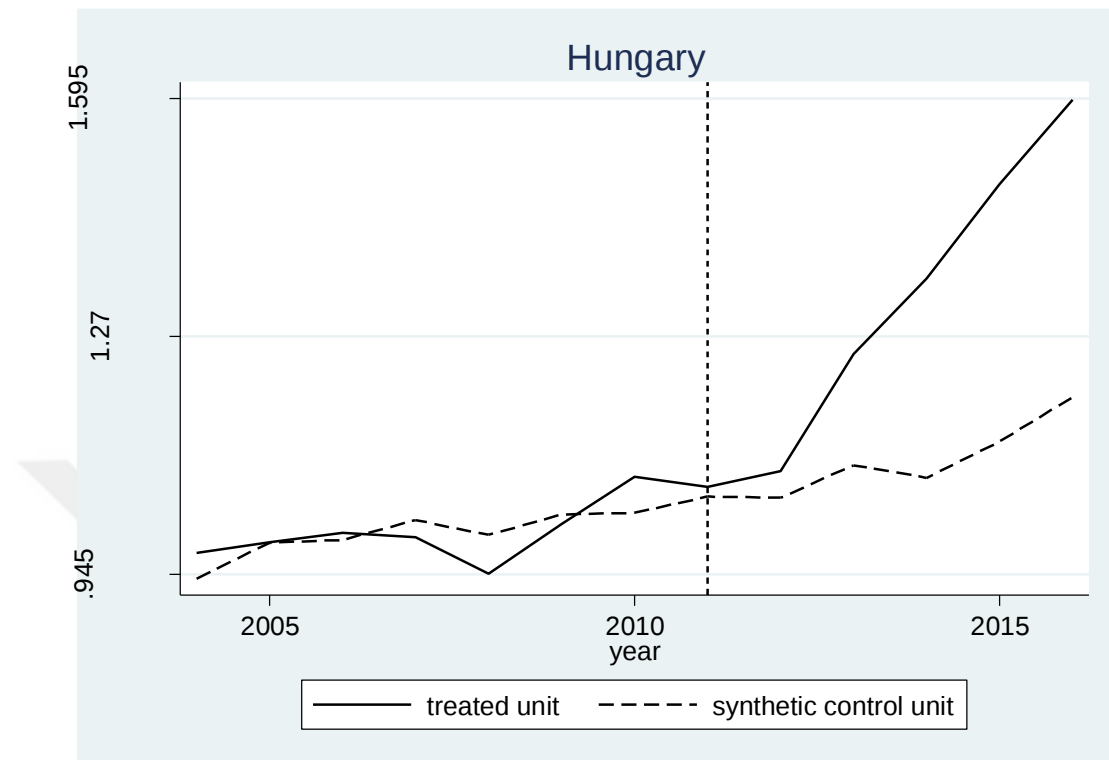
Table 6-2: Estimated effects and p-values with synthetic control method.

Treated Country	Estimated Effect	P-Value
Hungary	0.248	0.0286
Indonesia	0.0097	0.958
Venezuela	-0.131	0.917

Notes: Estimated Effect column shows the causal effect of deteriorating freedom level on treated countries' population of students abroad which represents the ratio of the population of students in each year to the average population of students of pre-treatment period for the countries of interest.

Figure 6-4 shows student mobility from Hungary and its synthetic control unit. The weighted average of the control countries' student mobility differs visibly after the treatment year. As a result of the freedom level deterioration experienced in Hungary in 2011, the average number of student mobility from Hungary increased by approximately 25% compared to the average of 2004-2010.

Figure 6-4: Student mobility trend from Hungary and synthetic control unit, 2004-2016



Notes: International Students represents the ratio of the population of students in each year to the average population of students of pre-treatment period for the countries of interest.

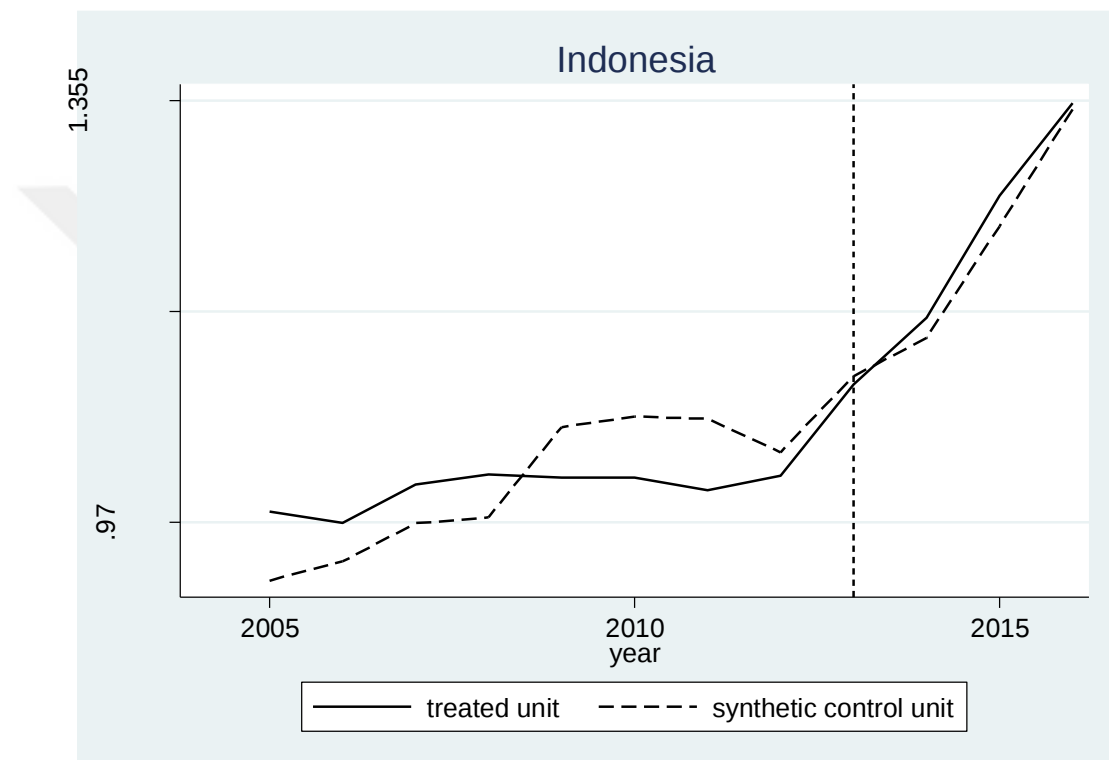
6.2.2 Indonesia

Treatment year of Indonesia is 2013 in which the CL value increased to 4. Its donor pool includes 22 control countries where the CL index was stable at the value of 3, 4, 5, 6, or 7. The list of these countries consists of Albania, Armenia, Bangladesh, Bolivia, Cambodia, El Salvador, Guatemala, India, Iran, Jamaica, Kazakhstan, Laos, Macedonia, Malaysia, Oman, Pakistan, Paraguay, Peru, Philippines, Qatar, Turkmenistan. Unlike Venezuela and Hungary, the period 2005-2016 is analyzed for Indonesia due to change (an improvement) in the CL value of Indonesia in 2004.

Indonesia's synthetic cohort consisted of Bolivia with 0.174 weight, India with 0.17 weight, Macedonia with 0.165 weight, Philippines with 0.16 weight, Jamaica with 0.105 weight, Albania with 0.086 weight, Paraguay with 0.055 weight, El Salvador with 0.054 weight, Peru with 0.033 weight.

We found a positive effect but not statistically significant result for Indonesia. As it is shown in Table 6-2 above, the freedom level deterioration experienced in 2013 affected the average number of student mobility from Indonesia by 0.96% compared to the average of 2005-2012, but this effect is not statistically significant.

Figure 6-5: Student mobility trend from Indonesia and synthetic control unit, 2005-2016



Notes: International Students represents the ratio of the population of students in each year to the average population of students of pre-treatment period for the countries of interest.

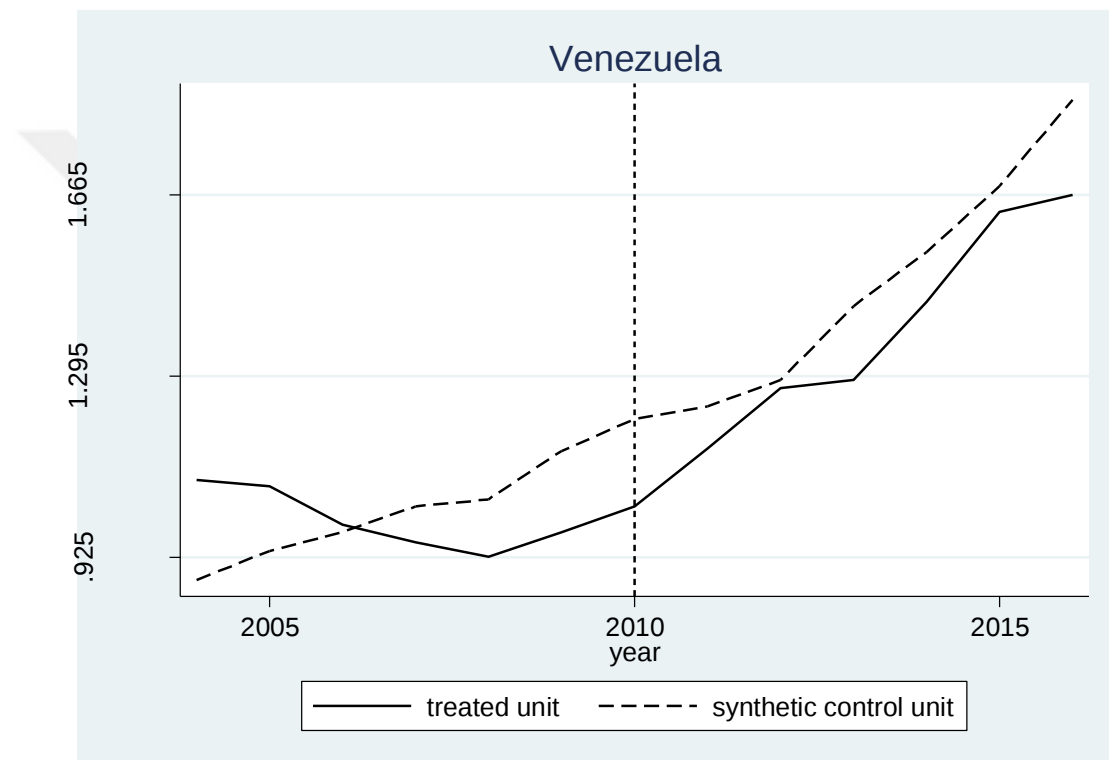
6.2.3 Venezuela

Venezuela's CL value increased to 5 in 2010 and its donor set consists of the same countries as Indonesia's. Its synthetic cohort consisted of Qatar with 0.151 weight, Macedonia with 0.102 weight, Jamaica with 0.088 weight, Albania with 0.075 weight, El Salvador with 0.054 weight, Paraguay with 0.053 weight, Bolivia with 0.045 weight, Armenia with 0.044 weight, Oman with 0.04 weight, Peru with 0.038 weight, Guatemala and Malaysia with 0.036 weight, Kazakhstan with 0.032 weight, Philippines 0.03 weight,

Belarus and Cambodia with 0.028 weight, Laos with 0.025 weight, Turkmenistan with 0.024 weight, Iran with 0.023 weight, Bangladesh with 0.022 weight, Pakistan with 0.019 weight and India with 0.023 weight.

Unlike Hungary and Indonesia, we found a negative relationship between CL deterioration and student mobility, but the estimated effect is not statistically significant.

Figure 6-6: Student mobility trend from Venezuela and synthetic control unit, 2004-2016



Notes: International Students represents the ratio of the population of students in each year to the average population of students of pre-treatment period for the countries of interest.

Section 7:

CONCLUSION

Population of international students in OECD countries has increased rapidly in the 2004-2016 period. This study shows that the deteriorating civil liberties in some origin countries is one of the contributors of this growth. To estimate the causal effect of the deteriorating freedom level on the mobility of international students, we apply the Synthetic Control Method (SCM) and the Difference-in-Differences (DD) approach. We found a statistically significant increase in the population of students pursuing higher education abroad for Hungary but not for Indonesia and Venezuela with the SCM. On the other hand, the DD approach shows statistically significant increases for Venezuela but not for Hungary and Indonesia.

This difference in results across research methods highlights the importance of finding a close comparison group in such quasi-experimental studies. For instance, the SCM provides a very close comparison group for Hungary, and we observe a statistically significant effect. On the other hand, the control groups that are constructed based on the synthetic control method do not resemble the corresponding treated country before the treatment for Indonesia and Venezuela. All estimated donor countries for Indonesia and Venezuela turn out to be countries that have already increasing student mobility before the treatment. However, student mobility from Indonesia and Venezuela before the treatment were stable or even decreasing in some years. As a result, estimates obtained by the SCM cannot show reliable causal effects for Indonesia and Venezuela. In sum, the methodology that provides a close comparison group (i.e., the group that has a similar trend of international students to the treated country before the change in the freedom index) shows a statistically significant increases in the number of students going abroad from origin countries with deteriorating freedom conditions.

In the end, raising and retaining well-educated human capital is an important determinant of the development level of countries. This issue has become more important in today's world where the international mobility of workers has been increasing. This study is a starting point in exploring sensitivity of the student mobility to deteriorating freedom level in their origin country. Our estimates show some supporting evidence for the hypothesis that deteriorating freedom triggers students to pursue foreign education.

We hope that future work will continue to analyze the role of democracy in student mobility.



BIBLIOGRAPHY

- Abadie, A. (2019). Using Synthetic Controls: Feasibility, Data Requirements, and Methodological Aspects. MIT Working Papers.
- Abadie, A., Diamond, A., Heinmueller, J. (2010). Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program. *Journal of the American Statistical Association* 105(490), 493-505.
- Abadie, A., Gardeazabal, J. (2003). The Economic Costs of Conflict: A Case Study of the Basque Country. *American Economic Review* 93(1), 113-132.
- Abbot, A., Silles, M. (2016). Determinants of International Student Migration. *The World Economy*, 39: 621-635.
- Beine, M., Noel, R., Ragot, L. (2014). Determinants of the International Mobility of Students. *Economics of Education and Review*, 41: 40-54.
- Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How much should we trust differences-in-differences estimates?. *The Quarterly Journal of Economics*, 119(1), 249-275.
- Bessey, D. (2012). International Student Migration to Germany. *Empirical Economics* 42.1: 345-361.
- Caruso, R. Wit, H. (2015). Determinants of Mobility of Students in Europe: Empirical evidence for the period 1998-2019. Munich Personal Repec Archive, 59086.
- Freedom House (2019). Freedom in the World 2019 Methodology.
- Freedom House (2019). Freedom in the World 2020.
- Kahanec, M., Kralikova, R. (2011). Pulls of International Student Mobility. IZA Discussion Paper n.6233.
- Kaushal, N., Lanati, M. (2019). International Student Mobility: Growth and Dispersion. NBER Working Paper No. 25921.

- Thomas K. J., Inkpen, C. (2017). Foreign Student Emigration to the United States: Pathways of Entry, Demographic Antecedents, and Origin-Country Context. *International Migration Review*, 51(3), 789-820.
- Wei, H. (2013). An Empirical Study on the Determinants of International Student Mobility: A Global Perspective. *Higher Education*, 66(1), 105-122.

